DISTRIBUTION AND ABUNDANCE OF DALL'S SHEEP NEAR JACKFISH RIVER, NORTHWEST TERRITORIES, IN JUNE 1984

Northwest Territories Renewable Resources
Wildlife Service
The Honourable Nellie Cournoyea, Minister

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DISTRIBUTION AND ABUNDANCE OF DALL'S SHEEP NEAR JACKFISH RIVER, NORTHWEST TERRITORIES, IN JUNE 1984

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ABSTRACT

Aerial surveys of the Liard, Kotaneelee, Tlogotsho and La Biche mountain ranges were conducted in June, 1984 in order to determine the early summer distribution and abundance of Dall's sheep (Ovis dalli). Five hundred and sixty-one sheep were counted: 134 rams, 236 nursery sheep, 141 lambs, and 50 unclassified adults. The majority (64 per cent) were observed o the Liard Range; none were observed on the La Biche Range. Lamb: Nursery Sheep ratios for the Liard and Kotaneelee ranges were 60:100 and 66:100, respectively, and are indicative of good reproductive performance. Northcor Energy Ltd.'s drilling operations at Jackfish River had a negligible impact on Dall's sheep summer habitat. The potential for excessive harvesting of Dall's sheep as a result of Northcor's access routes into the mountains is considered to be low.

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INTRODUCTION

On 28 October 1983, Northcor Energy Ltd. of Calgary, Alberta was issued a Land Use Permit (N83A994) by Indian and Northern Affairs Canada to drill an exploratory gas well at the headwaters of Jackfish River in the Mackenzie Mountains, Northwest Territories (NWT). Access to the drill site was provided by constructing a new winter road from the terminus of the Pointed Mountain road, which services a gas field near Fisherman Lake, and a new airstrip along Jackfish River (Figure 1). These transportation routes provide limited access to the Liard, Kotaneelee and Tlogotsho ranges, areas which formerly were inaccessible to most vehicular traffic.

The Department of Renewable Resources recognizes that increasing levels of access to pristine areas in the Mackenzie Mountains represent a potential threat to wildlife resources. In particular, improved access may lead to the depletion of local wildlife populations by concentrating hunter activity in selected areas.

The purpose of the present study is to gather baseline information on the distribution and abundance of Dall's sheep (Ovis dalli) in the vicinity of Northcor's drilling operation and associated transportation corridors, prior to the first hunting season following construction of the road and airstrip. Prior to

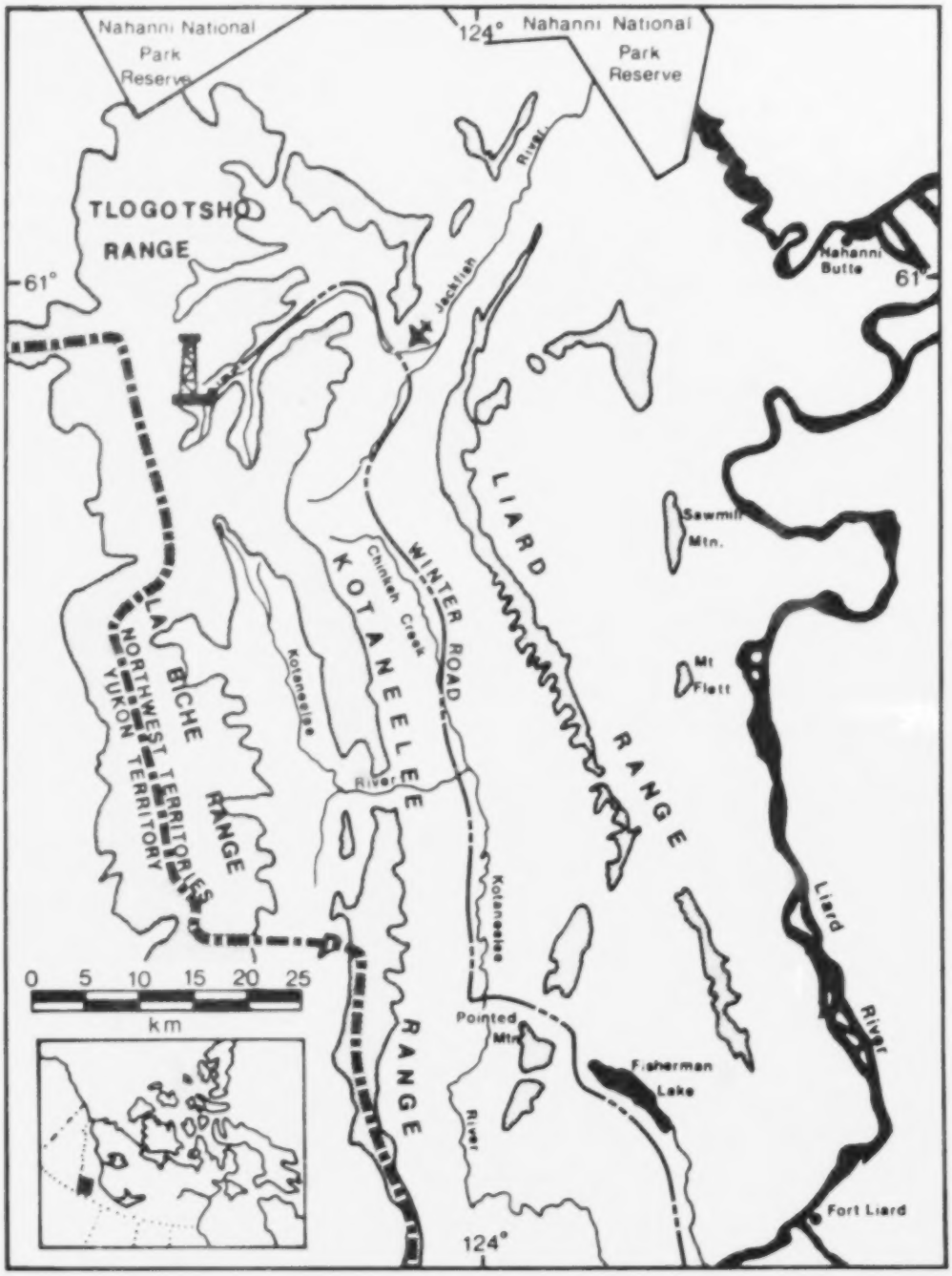

Figure 1. Location of study area, southern Mackenzie Mountains, NWT.

1984, baseline data for Dall's sheep in the mountain ranges adjacent to Jackfish River are generally lacking. Part of the Tlogotsho Range was surveyed in August 1982 (Kozachenko 1983), but the Liard and Kotaneelee ranges had not been surveyed previously. General distribution maps delineating summer and winter ranges of Dall's sheep in the Mackenzie Mountains were prepared by Simmons (1982a,b).

The specific objectives of this study are:

1. To document the early summer distribution and abundance of Dall's sheep on the Liard, Kotaneelee, Tlogotsho and La Biche ranges;
2. To gather preliminary data on the reproductive performance of Dall's sheep on these ranges;
3. To assess the potential for excessive harvesting of Dall's sheep as a result of the new access created by Northcor's exploration; and,
4. To report on the impact of Northcor's drilling operations on Dall's sheep summer habitat.

STUDY AREA

The study area is located in the southern part of the Mackenzie Mountains, NWT (Figure 1). It is a diverse and complex area owing to the altitudinal variability associated with the four mountain ranges. Elevations on the study area range from 200 m above sea level (asl) along the Liard River to 1850 m asl on the highest point of the Kotaneelee Range. Plant communities are diverse also, ranging from tall stands of white spruce (Picea glauca), balsam poplar (Populus balsamifera) and pine (Pinus spp.) along the major drainages, to alpine communities of grasses, mosses and lichens at higher elevations. The tree line generally occurs at approximately 1280 m asl.

It is outside the scope of this study to give a complete account of the biophysical properties of the entire area. For more detailed information, the reader is referred to the Mackenzie Mountains Region Baseline Study which describes the geology, geomorphology, soils, vegetation and wildlife of the area (Canada, Environment Canada 1982).

METHODS

Aerial surveys of Dall's sheep were conducted between 25 and 27 June 1984 on the Liard, Kotaneelee, Tlogotsho and La Biche mountain ranges using a Bell 206B helicopter equipped with "bubble" side windows. We directed our search efforts to areas above the tree line by following topographic ridges and other natural contours. Opposite slopes below a narrow ridge could generally be surveyed simultaneously by making a single pass above the ridge. For wider ridges and plateaus, it was necessary to fly along each slope independently in order to obtain adequate coverage of potential sheep habitat. Air speed approximated 145 km/h during the survey flights. We attempted to maintain an altitude of at least 75 m above ground in order to reduce disturbance of sheep (Krausman and Hervert 1983). Actual flying altitude varied considerably due to the rugged topography. The survey crew comprised a pilot, an observer/navigator/recorder, and two observers.

Sheep were generally counted and classified from the air, although on three occasions large nursery bands were viewed with binoculars and a spotting scope from a remote location on the ground, in order to obtain an accurate count and classification of individuals. Sheep in nursery bands were classified into two categories: Lambs (easily identified from the air by their small size) and Nursery Sheep. Nursery Sheep means an adult member of

of a nursery band which comprises ewes, yearlings and (possibly) a few young rams (Hoefs and Cowan 1979). From the air, it was difficult to distinguish ewes, yearlings and young rams. Therefore, these cohorts were lumped in order to minimize the introduction of errors in calculations of reproductive performance.

In this report, reproductive performance is expressed as the number of Lambs per 100 Nursery Sheep. Although this expression is a poorer measure of reproductive performance than the ratio of the number of Lambs per 100 Ewes of reproductive age, it is widely used by researchers and offers a basis for comparison with other populations. Under favourable survey conditions, older rams (3+ years of age) were readily distinquished from all other sex and age classes on the basis of horn size and configuration (Geist 1971).

RESULTS AND DISCUSSION

Survey Effort and Conditions

Aerial coverage of the Liard, Kotaneelee, Tlogotsho and La Biche ranges took 2.4, 1.7, 3.0 and 0.8 hours of survey time, respectively. The La Biche Range survey was incomplete; only the area east of the Yukon/Northwest Territories boundary was surveyed. Weather conditions on 25 and 26 June were characterized by warm temperatures, partially overcast skies, light winds and generally excellent visibility. Brief, intermittent showers during the afternoon of both days did not hamper survey effort nor reduce visibility significantly.

On 27 June, strong westerly winds precluded complete coverage of all potential sheep habitat on the Tlogotsho Range. We were able to survey the ridge tops and plateaus, but forceful updrafts and downdrafts associated with slopes prohibited thorough coverage of talus slopes and cliff faces, particularly along the western and northern flanks of this range. Otherwise, visibility of the terrain was generally excellent.

Snow cover on alpine areas was estimated to be approximately one per cent for the Liard, Kotaneelee and La Biche ranges, and approximately five per cent for the Tlogotsho Range.

Dall's Sheep Distribution and Abundance

Five hundred and sixty-one sheep were counted on the study area, with the majority (64 per cent) located on the Liard Range (Table 1; Figures 2, 3 and 4). The high proportion of unclassified sheep on the Tlogotsho Range (44 of 121 individuals) reflects the unfavourable wind conditions encountered during that part of the survey. The result for the Tlogotsho Range should be regarded as a minimum estimate because of incomplete coverage of this range.

The size of 34 ram groups ranged from 1 to 15 animals with a mean of 3.9 animals. It was more difficult to ascertain the initial size of nursery bands because of the tendency of nursery sheep to group together when approached by the helicopter. For example, the three largest ewe/lamb concentrations on the Liard Range (54, 62 and 100 sheep) each comprised many smaller nursery bands which congregated in escape terrain during the survey. When these assemblages are eliminated from the sample, the size of the remaining 14 nursery bands ranged from 2 to 18 individuals with a mean of 9.5 individuals.

The Liard Range north of 60°35'N constitutes good habitat for nursery sheep, as demonstrated by the relative distribution and abundance of sheep (Table 1) and its physiographic features. The Liard Range is a narrow, linear range with sharp ridges, talus slopes and nearly vertical cliffs scattered along its

Table 1. Results of Dall's sheep aerial surveys near Jackfish River, June 1984.

Mountain Range	Number of Sheep Observed				
	Nursery Sheep	Lambs	Rams	Unclassified Adults[a] (1+ years)	Totals
Liard Range	175	105	77	1	358
Kotaneelee Range	32	21	24	5	82
Tlogotsho Range	29	15	33	44	121
La Biche Range	0	0	0	0	0
Total	236	141	134	50	561

[a] Adults could not be approached for determination of sex due to inaccessible terrain and/or unfavourable wind conditions.

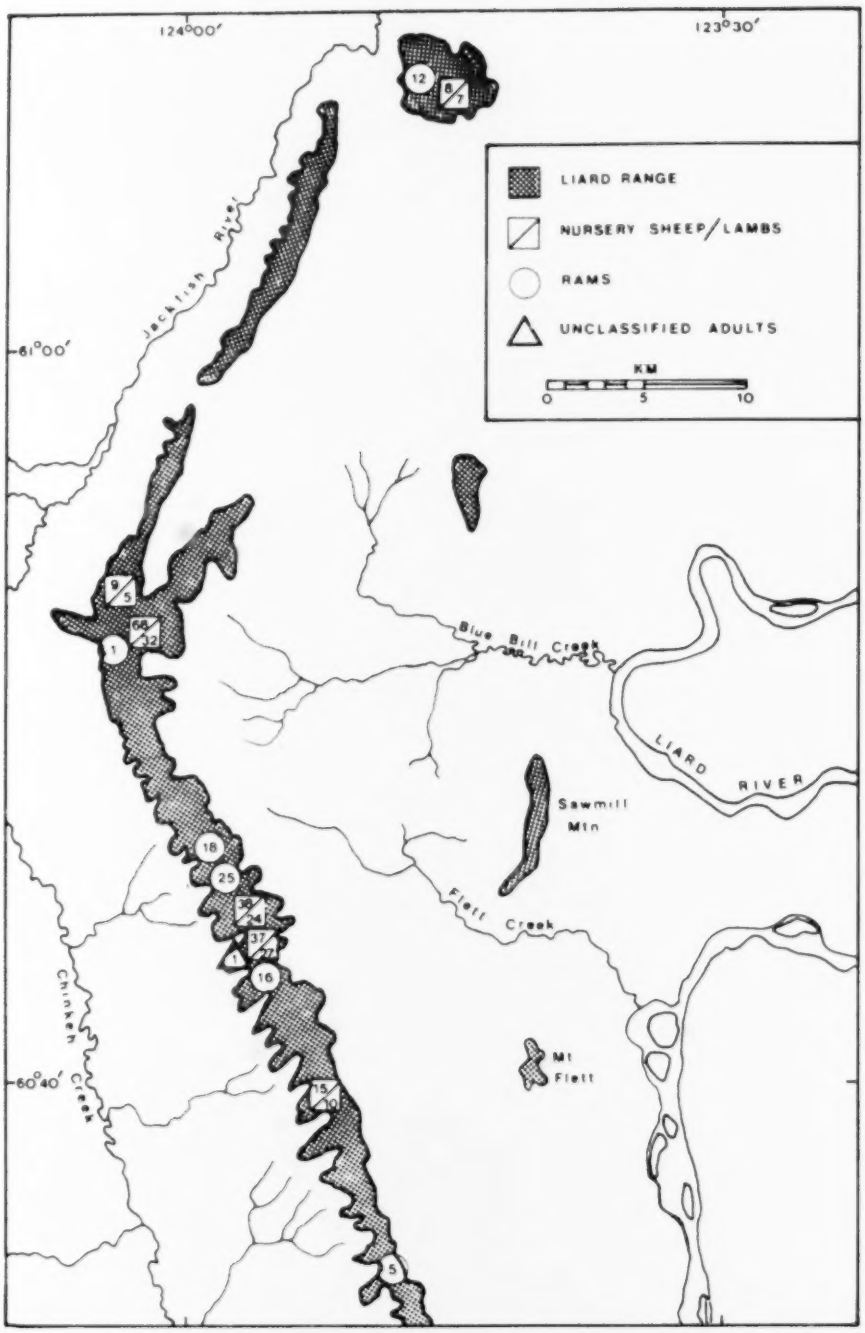

Figure 2. Locations of Dall's sheep observed on the Liard Range, 25 and 26 June 1984.

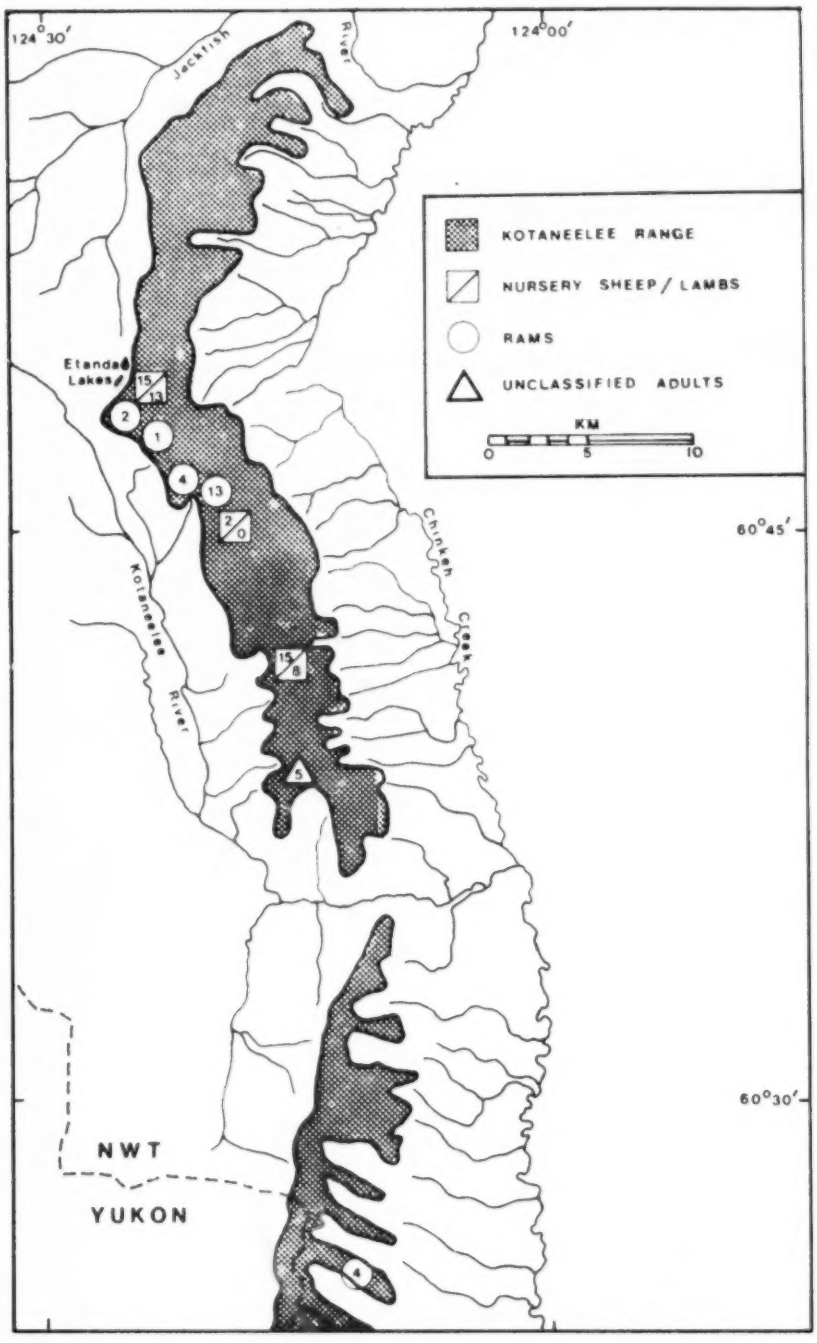

Figure 3. Locations of Dall's sheep observed on the Kotaneelee Range, 26 June 1984.

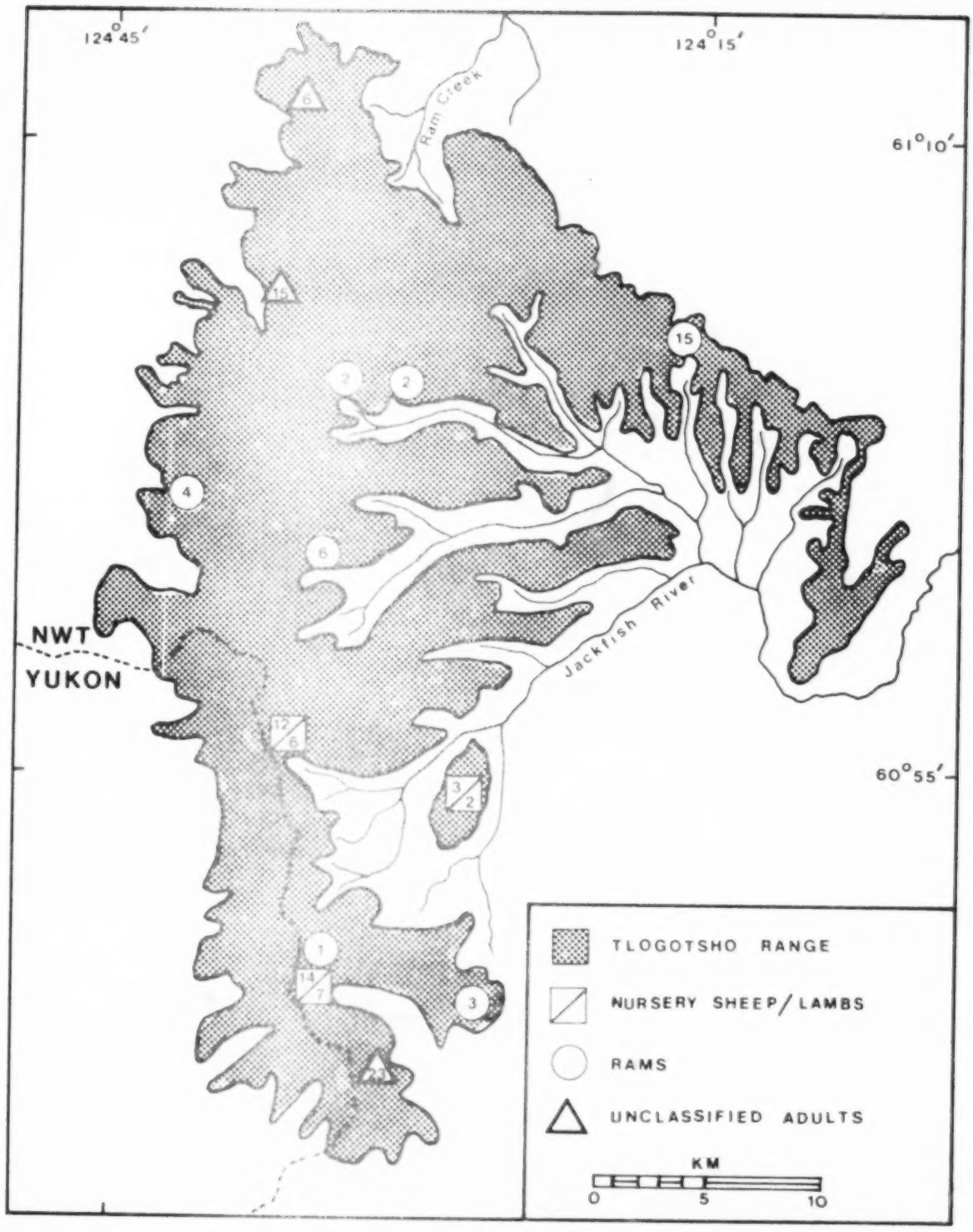

Figure 4. Locations of Dall's sheep observed on the Tlogotsho Range, 27 June 1984.

length. These are interspersed with gently sloping saddles and alpine meadows with abundant vegetation (Figure 5). This combination of habitat types in close proximity provides excellent summer range for Dall's sheep, particularly nursery bands (Nolan and Kelsall 1977). The alpine meadows are used for foraging; the steep, broken slopes provide escape terrain.

The general topography of the Kotaneelee and La Biche ranges is less rugged. Higher elevations are characterized by smooth, rounded summits, giving the appearance of a strongly rolling plateau, as opposed to the sharp crests and ridges of the Liard Range. Accordingly, there are fewer sites on the Kotaneelee and La Biche ranges where ewes and lambs could find suitable escape terrain. Due to inclement weather, we were unable to survey many areas on the Tlogotsho Range which appeared to be suitable for nursery bands.

Mineral licks play an important part in the summer distributions of sheep (Nolan and Kelsall 1977); therefore, the distributional pattern of sheep on the study area may also reflect the presence of licks.

We did not identify any licks during our survey, and as far as we could determine, there are no published accounts of mineral lick locations for the study area.

Figure 5. Interspersion of alpine meadows with steep, broken slopes on the Liard Range provides excellent summer habitat for nursery bands. (Seventy-five nursery sheep and 51 lambs were observed on this site on 25 June 1984.)

Reproductive Performance

Lamb:Nursery Sheep ratios for the Liard and Kotaneelee ranges were 60:100 and 66:100, respectively.

A ratio is not given for the Tlogotsho Range because 42 per cent of adult sheep on this range were not classified (Table 1), and survey coverage was incomplete. Estimates of reproductive performance that are based on only a few sample nursery bands are subject to great error because of the tendencies of ewes with lambs and those without lambs to form separate bands (Hoefs and Cowan 1979).

Potential Impacts of Increased Access

The potential for excessive harvesting of Dall's sheep as a result of the new access created by Northcor's exploratory activities is considered to be low for several reasons:

1. The winter road begins at the terminus of the Pointed Mountain road, and extends north along Kotaneelee River and Chinkeh Creek before heading west along Jackfish River to the drilling site (Figure 1). For most of its length, the road closely follows the drainages and is generally confined to the valley bottoms at low elevations (450-600 m asl), except near the headwaters of Jackfish River (900-1050 m asl). Hunters gaining access to the study area via the winter road

would have to travel a further 5-10 km up steep, heavily wooded slopes before reaching the alpine habitats of either the Liard, Kotaneelee or Tlogotsho ranges, a vertical distance of 680-830 m. The La Biche Range is at least 15 km from the winter road.

2. Summer travel on the road is practically impossible because of the many unbridged river crossings.
3. The winter road, 96 km in length, traverses a vast area of uninhabited, mountainous country. It seems unlikely that the road itself would lead hunters to concentrate in a particular location. Consequently, local depletions of Dall's sheep due to hunting pressure seem improbable at this time.
4. The airstrip is situated along the valley floor of Jackfish River, at an elevation of 490 m asl. Persons using this airstrip for the purpose of hunting Dall's sheep would be faced with similar logistical constraints as those gaining access via the winter road. Alpine habitats are far removed from the airstrip.
5. After the sheep surveys were completed, Northcor's exploratory site at Jackish River was abandoned because the drilling results proved to be negative. Accordingly, the future of the airstrip and its continued upkeep are uncertain. In response to a request by the Department of Renewable Resources in April 1984, Indian and Northern

Affairs Canada instructed Northcor to render the airstrip inoperative in the event of a dry well. The airstrip is presently out of service to fixed wing aircraft due to the placement of log barriers along its length (F. Adlem, pers. comm).

Impacts on Dall's Sheep Habitat

Northcor's drilling operation and the associated transportation corridors have not had any direct effects on Dall's sheep summer habitat because their facilities were located below the tree line.

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PERSONAL COMMUNICATIONS

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LITERATURE CITED

Canada, Environment Canada. 1982. Mackenzie Mountains region baseline study. Part I: Composite data set numbers 1, 2 and 3. Part II: Composite data set number 4, ecodistrict fact sheets for South Nahanni (95 S.W.) and Simpson-Liard (95 S.E.). Preliminary bibliography.

Geist, V. 1971. Mountain Sheep. A study in behavior and evolution. The University of Chicago Press. Chicago and London. 383 p.

Hoefs, M. and I. McT. Cowan. 1979. Ecological investigation of a population of Dall sheep (Ovis dalli dalli Nelson). Syesis, Volume 12, Supplement 1, The British Columbia Provincial Museum. 81 p.

Kozachenko, B. 1983. Nahanni National Park aerial wildlife survey program, 1982-83. Parks Canada unpublished report. 44 p.

Krausman, P.R. and J.J. Hervert. 1983. Mountain sheep responses to aerial surveys. Wildlife Society Bulletin 11:372-375.

Nolan, J.W. and J.P. Kelsall. 1977. Dall sheep and their habitat in relation to pipeline proposals in northwestern Canada. Canadian Wildlife Service report for the Mackenzie Valley Pipeline Investigations. 64 p.

Simmons, N.M. 1982a. Seasonal ranges of Dall's sheep, Mackenzie Mountains, Northwest Territories. Arctic 35:512-518.

Simmons, N.M. 1982b. Seasonal distribution of Dall's sheep in the Mackenzie Mountains, Northwest Territories. NWT Wildlife Service File Report Number 21. 47 p.